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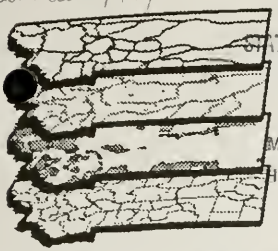

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MONTANA GIS NEWS

Montana GIS Users Group — Summer 1994

STUDENT WATER QUALITY HEROS

by Mark Decker, Ronan High School

Water is an agent that binds one society to another society. Water quality awareness is important for all people, today and into the future. It involves a process of education. The scientific method provides the process for an environmental analysis of a local stream (Spring Creek) to be completed by students from Ronan High School's Montana Natural History and advanced chemistry classes. The project is titled "Student Water Quality HERO's" and it has been funded by the National Science Foundation through Montana State University and the Alliance of States Supporting Indians in Science and Technology (ASSIST). The project director is Mark Decker, a science teacher at Ronan High School in Ronan, Montana. The school is on the Flathead Indian Reservation.

Standard water quality sampling techniques are used to complete the environmental analysis of Ronan's Spring Creek. Tests include dissolved oxygen, pH, percent of stream covered by vegetation, water and air temperature, velocity, discharge, habitat type, aquatic insect observations and counts, sulfates, nitrates, phosphates, carbon dioxide, turbidity, and total dissolved solids.

The water quality data are entered into a laptop computer in the field by the students and instructor. In the last year students and instructors have explored the use of geographical information systems (GIS). In the coming school year plans are to incorporate a GIS desktop mapping program called MapInfo and global positioning units. All the water quality sampling sites will be coded using latitude and longitude readings. Each site will then be referenced to the topographic maps in the computer program.

To summarize the project, students use natural resource simulators to observe water quality issues. Students are *See "Heros" page 5*

SCHOOL COMMITTEE FORMED AT 1994 MONTANA GIS CONFERENCE

During the Users Group business meeting, at the Montana GIS Conference in Kalispell, a committee was formed to involve K-12 students with geography and GIS. The Users Group would like to promote geography awareness and the use of GIS in schools and local communities. Several ideas are being researched by the school committee.

Perhaps the best idea mentioned (and naturally the most costly and time intensive), is for User Group members to sponsor a school. The ideal situation would be for the Users Group to acquire hardware, software, and data for the schools, and then make a time commitment to get the schools started (and keep them going).

There are many options for acquiring the hardware, software, and data including public domain and shareware GIS packages that can be used on PC's as well as grant programs for commercial GIS packages that need more powerful hardware. Many schools have computers capable of running GIS software and there are a variety of options for acquiring the hardware if the school doesn't have what it needs. Data can be acquired from the local GIS community or from NRIS at the State Library. *See "School Committee" page 2*

Highlights of this issue...

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BRINGING GIS TO LOCAL CLASSROOMS

Institutions that would like to share their GIS software and expertise with local primary and secondary schools, as well as teachers who are interested in incorporating GIS into their teaching, have a new resource. The Workshop Resource Packet (Technical Report 93-2), based on the National Center for Geographic Information and Analysis GIS workshops for teachers, includes a section on GIS in the schools, outlines of teacher-designed GIS projects, a model format of a GIS workshop for teachers, notes for the GIS short course, a list of GIS and related resources for teachers, and a glossary of basic GIS terminology. You may obtain a copy from the NCGIA Publications Office: phone: 805-893-8244, fax: 805-893-8617, ncgia@ncgia.ucsb.edu.

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"School Committee" continued from page 1

The hardest resource to acquire is expertise on how to use the technology in a meaningful way.

The school committee feels strongly that the only way for this program to be successful is for local GIS users to get actively involved. If you are willing to sponsor a school in your community, the User Group will assist you in acquiring the other components needed to implement a GIS. Many members present at the meeting expressed a particular interest in reaching out to smaller schools and libraries that probably don't have GIS practitioners in their communities. This problem poses many challenges and the school committee would be interested in hearing about ideas for achieving this goal.

Another suggestion was for the Users Group to help schools develop geographic databases of Montana to exchange with sister schools in other countries. Again this suggestion would involve a time commitment to find or develop the materials needed by the interested schools.

A third suggestion was to implement an "Olympics of the Mind" in which communities in Montana would have the opportunity to sponsor an analysis team (high school, college, or mix). Each team would have a sponsor/team leader who is a member of the Montana GIS Users Group. The Users Group would provide each team with the same problem set and the software necessary to carry out the set of questions. The teams would have a specified amount of time to complete an analysis, and make a presentation to the judges.

A fourth idea was to encourage members of the Users Group to provide workshops or give tours of their facilities to the schools. Members might simply set up a booth at the local science fair or give an award for the most creative application of geography or science. The Users Group could make a scholarship available to a deserving student.

At the very least, we would like to encourage personal involvement. Put on a workshop for a school (teachers/teachers and selected students) or give them a tour of your facility. Loan local schools or libraries computer equipment. Be creative. The following people at schools and libraries throughout the state already have GIS software but would welcome support or encouragement: Dennis Richards at the University of Montana Mansfield Library in Missoula, 243-6700; Tim Urbanic at the Billings Vo-Tech Library, 656-4445; Bill McGregor at the Citizens Technical Environmental Committee in Butte, 496-4433; Michael Ober at the Flathead Valley Community College 756-3822; Dennis Brown at Capital High School in Helena, 442-8600; Norma Glock at Columbus High School Library in, 322-5373; John Meckler at the Plains High School, 826-3666; Arlie Patton at Billings West High, 655-3101; Chris Ruffatto at the Whitefish High School, 862-8600; or Gil and Marilyn Alexander at Canyon Ferry Limnological Institute, 475-3638.

If you have thoughts or comments on these issues, or if you are interested in serving on the school committee, please contact one of the members. You may reach Monte Sealy in Roundup at 323-2755, Sue Haverfield in Kalispell at 758-5526, or Kris Larson in Helena at 444-5691.

CLINTON SETS GOALS FOR NSDI AND FGDC

President Issues Executive Order

by Bob Gurda, Assistant State Cartographer

President Clinton has strengthened and enhanced federal policies on coordination and sharing related to the National Spatial Data Infrastructure (NSDI). In his Executive Order dated April 11, 1994, Clinton specified a number of initiatives, functions, goals, and timelines for achieving progress toward more effective and efficient development and maintenance of geospatial data.

State, local, and tribal governments are identified in the Executive Order to have roles in these activities. Such involvement is specified in the following areas: development of a national geospatial data clearinghouse; development of standards for implementing the NSDI; planning for initial implementation and ongoing maintenance of a national digital geospatial data "framework"; and cooperative partnerships with federal agencies to acquire data.

Coordination responsibility for carrying out the mandates of the new Executive Order is assigned to the Federal Geographic Data Committee (FDGC), which was created in 1990 at the direction of the President's Office of Management and Budget (OMB). Secretary of the Interior Bruce Babbitt chairs the FGDC. The order directs individual federal agencies to assign a person with a policy-level position to serve on the FGDC, and to comply with several deadlines relating to the clearinghouse, framework, and partnerships sections of the order.

Federal agency clearinghouse activities that are specified in the order include the following (with number of months until implementation):

- document new geospatial data (using a specified FGDC standard), and make it electronically accessible (9 months) establish plan to retroactively document previously existing geospatial data (12 months)
- adopt internal procedures to ensure that, prior to expenditure of federal funds to collect or produce new geospatial data, the agency accesses the clearinghouse network to determine whether others have already collected the data, or if cooperative efforts to obtain the data are possible (12 months)

The order also establishes timelines for developing the national "framework" data and partnership strategies:

- FGDC to submit a plan to OMB for initial completion of the "framework" by January 2000 (9 months); at a minimum, the plan is to address how the initial transportation, water, and boundary elements of the framework might be completed by January 1998 in order to support the decennial census of 2000 (9 months)
- Secretary of Interior to develop strategies for maximizing cooperative participatory efforts with state, local, and tribal governments, the private sector, and other nonfederal organizations to share costs and improve efficiencies of acquiring geospatial data (9 months)

This Executive Order is broad in its scope and ambitious in its timelines. If Babbitt and the numerous federal agencies involved in the FGDC make a serious coordinated commitment toward the initiatives and planning called for in the order, significant changes and improvements in the nation's spatial data infrastructure are a real possibility.

State, local, and tribal governments and other entities will have a major opportunity to share in the collection, maintenance, and access to this valuable information. That is why we are talking about a national resource, rather than simply a federal data product.

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MONTANA GIS CONFERENCE TO BROADEN FOCUS

Planning for the Seventh Annual Montana GIS conference is in progress. The conference will be in Helena on May 8th to the 11th, 1995. In addition to having the usual strong natural resource content, the conference will highlight local government GIS issues. There will be workshops, plenary sessions, and an entire concurrent track will focus on local government GIS applications. Conference organizers are also looking for ways to attract more administrators and policy makers to the conference. Many GIS users in Montana are not getting the administrative support they need to fulfill the potential of GIS in their organizations. Since this years conference is in Helena, it is a great opportunity to educate the administrators of many state and federal agencies on the uses and potential of GIS.

If you would like to assist in conference organization or have ideas about workshops or presentations you would like to see at the conference, call Pam Smith at (406) 444-5357.

GIS STEERING COMMITTEE ANNUAL MEETING

In Montana, interagency coordination of GIS activities and data sharing are coordinated under the authority of a unique memorandum of understanding (MOU) signed by 20 state and federal agencies. Specific goals of the MOU are to: establish a cooperative effort to share digital data among the various users within the state; make available all relevant databases managed by participating agencies; develop priorities for joint data development projects; investigate opportunities to jointly fund projects to create statewide themes for Montana; develop and share new and emerging GIS technologies and promote the use of GIS by resource managers, scientists, educators, and where appropriate, the general public.

The MOU established a Technical Working Group (TWG) and an Interagency GIS Management Steering Committee to oversee the work of the TWG. The Steering Committee consists of one management representative from each agency signing the MOU. The purpose of the Steering Committee is to develop an action plan to meet the objectives of the MOU, and to provide necessary direction to the TWG. The Steering Committee identifies potential interagency projects, determines long-term direction and operational parameters, and directs the implementation of action items. The TWG carries out tasks as directed by the Steering Committee.

The Steering Committee last met in Great Falls on March 16. At that annual meeting, the members heard status reports for the creation of the statewide ownership/public land survey database being created by the Bureau of Land Management in Billings; the statewide hydrography layer being coordinated by the Natural Resource Information System at the Montana State Library; statewide soils data being digitized by the Soil Conservation Service in Bozeman; and statewide topography by the U.S. Geological Survey. (See related article on statewide GIS data status). In addition, Fred Gifford, Chair of the Montana GIS User Group, briefed the Committee on the Annual GIS Conference in Kalispell (see related article).

In the main action of the meeting, the Steering Committee set the tasks for the TWG for the coming year. The charges to the TWG for this year are:

Continue Feasibility Studies on Statewide GIS Data: The TWG will continue its task of reviewing and examining the feasibility of developing the statewide GIS data layers identified in the *Montana GIS Standards Plan*. A report on the status of the development of the priority layers should be presented at the next meeting of the Steering Committee.

Review/revise the *Montana GIS Standards Plan*: The TWG will review the *Montana GIS Standards Plan* both for its appropriateness as well as its currency. The TWG will review the *Plan* and make appropriate updates and revisions. The TWG will specifically examine and appropriately revise the sections of the *Plan* that address metadata and data lineage.

Develop a Plan for Statewide Data Clearinghouse as Part of the National Spatial Data Infrastructure: The Federal Geographic Data Committee, charged with developing the National Spatial Data Infrastructure (NSDI), has proposed a National Clearinghouse for GIS data as part of the NSDI. The TWG should investigate how Montana agencies should participate in this clearinghouse. The TWG will develop a plan for the design, implementation, operation, and maintenance of a Montana portion of the Clearinghouse. The TWG is directed to apply for a grant from the U.S Geological Survey to support the development of the plan. *(Note: The grant application was submitted June 13, 1994)*

Work with the U.S. Geological Survey to Improve Mapping Program Coordination: The TWG will work with the National Mapping Division (NMD) of the U.S. Geological Survey to improve coordination of NMD's national mapping program as it relates to the production of map data for Montana. In particular, the TWG will work with NMD to better implement the A-16 Circular map request process managed by NMD.

Montana GIS News is published by the Montana GIS User Group, a statewide consortium of Montana governmental agencies and businesses. It is published at the Natural Resource Information System in the Montana State Library. Send articles and information for publication to NRIS. To receive the *Montana GIS News*, contact:

Montana GIS News
NRIS, Montana State Library
1515 East Sixth Avenue
Helena, MT 59620-1800
(406) 444-5354
internet address: psmith@nris.msl.mt.gov

1995 MONTANA GIS CONFERENCE

May 8 - 10

The Colonial Inn, Helena, Montana

ABSTRACT SUBMISSION FORM

Please complete this form, attach abstract, and return on or before January 31, 1995. Notification of acceptance will be February 7 - 10, 1995.

PERSONAL:

Author Name_____ Title _____

Organization_____ Phone (____) _____-_____

Address_____ Fax (____)_____-_____

_____

City _____ State _____ Zip _____

INTENDED AUDIENCE:

NOVICE GIS USER ___ EXPERIENCED USER ___ MANAGER ___ OTHER _____

TYPE OF PRESENTATION:

TECHNICAL PAPER ___ ELECTRONIC DEMONSTRATION ___ PANEL DISCUSSION ___

- PAPER: Submissions should include completed form, paper title and abstract. The abstract should summarize the presentation, include some mention of purpose, and end with conclusions/recommendations. In addition, abstracts of presentations reporting investigative research should mention methods and results. Abstracts should contain no more than 200 words and be single spaced.
- DEMO: Submit completed form, demonstration title and abstract. The abstract should summarize the demonstration including the topic and purpose of the application. Abstracts should contain no more than 200 words and be single spaced.
- PANEL: Submit completed form, discussion topic and abstract. The abstract should provide a general background of the subject area to be covered. Include panel member names, titles, and organizations, as well as an indication of their expertise in the area. Abstracts should contain no more than 200 words and be single spaced.

AUDIO VISUAL NEEDS (Please check all that apply):

SLIDE PROJECTOR ___ OVERHEAD DISPLAY ___ FLIP CHART/EASEL ___

OTHER _____

TIME FRAME:

Presentations will be scheduled at 30 minute intervals. Typically, a presenter will speak for 20-25 minutes, allowing some time for questions. If you plan to have a panel discussion or need more time for demonstrations, please indicate.

HALF-HOUR ___ OTHER_____

INCLUDE A SOFT COPY OF YOUR ABSTRACT ON 3.5" DISKETTE OR SEND VIA INTERNET.

Please return this form and abstract to:

Pam Smith
NRIS/Montana State Library
1515 East Sixth Avenue
Helena, MT 59620-1800
Phone: (406)444-5354 FAX: (406)444-0581
Internet: psmith@nris.msl.mt.gov

1995 MONTANA GIS CONFERENCE

May 8 - 10

The Colonial Inn, Helena, Montana

The Montana GIS Users Group invites you to present a technical paper at the Seventh Annual Montana GIS Conference to be held in Helena, Montana, May 8 - 10, 1995. An electronic demonstration (video/software application) or panel discussion can be accepted in lieu of a technical paper. The preliminary schedule has been set:

- Pre-conference Workshops - Monday, May 8
- Keynote address and afternoon Concurrent sessions - Tuesday, May 9
- Concurrent sessions all day - Wednesday, May 10.

The Montana GIS Conference attracts a wide variety of GIS Users from federal, state, and local government, as well as private organizations. There will be three concurrent tracks which will focus on Local Government, Natural Resources, and Applications. Since the conference is in the capital city this year, we want to draw in more people from government agencies, and target at least part of the conference to administrators. Within this general context, presentations will be accepted. Possible Topics include, but are not limited to:

- GIS in Rural Communities
- Parcel Delineation
- Ecosystem Management
- Fire Management
- Water Resources
- GIS User Applications
- Techniques for Using GIS
- Planning & Zoning
- Landuse (Recreation, Forestry, etc)
- Habitat Delineation/Modeling
- Permitting (Mines, Dams, etc)
- GIS & Related Technology
- GIS and the User Interface
- GIS Database Design & Management

This year we will be publishing accepted abstracts in the conference program several weeks before the conference so that attenders can plan their schedules ahead of time. For this to be successful we have a tight schedule to follow.

ABSTRACTS DUE: January 31, 1995
Abstracts are required for presentations, demonstrations, and panel discussion topics. An abstract submission form is included with this mailing & may be reproduced. Please indicate the type of presentation you will be making and any special equipment needs you may have. Submitted abstracts must be postmarked or faxed on or before the due date. Please send a soft copy of your abstract on 3.5" diskette or via the internet . Questions concerning abstract submission may be directed to Kris Larson, (406)444-5691 or Cathy Maynard (406)449-0670.

ACCEPTANCE NOTIFICATION: February 7 - 10, 1995
Presentations will be chosen based on information supplied in the abstract. Selection decisions will be made be the Montana GIS Program Planning Committee based on the applicability and general mix of topics.

For more information about the conference, contact:

Tom Ring
Dept of Natural Resources & Conservation
1520 East Sixth Avenue
Helena, MT 59620
Phone: (406)444-6785

OR

Loretta Thomas Reichert
Department of State Lands
1625 Eleventh Avenue
Helena, MT 59620
Phone: (406)444-2074

MT GIS USERS GROUP MEETING

The Montana GIS Users Group held its annual meeting on Friday, April 8, in Kalispell on the last day of the annual Montana GIS Conference.

The first order of business was to announce two new board members, one to fill a vacant position, and one in a new position. Kris Larson, Natural Resource Information System, and Don Krogstad, Flathead USFS, were elected. They will join Ken Wall, Fred Gifford, Don Cromer, and Stu Kirkpatrick on the User Group Board of Directors.

The main focus of the meeting was to inform members of the previous years activities and to solicit ideas for the future.

Group members were asked to adopt the proposed User Group Bylaws and were asked to approve a Board decision to fund the *Montana GIS News* through conference fees. The Bylaws were approved with minor modifications and the newsletter funding was approved.

There was extensive discussion on potential activities for the coming year. Ideas included: developing internet access to data; using the Internet to facilitate communication; sponsoring mid-year training or workshops in local areas; developing a Montana CDROM data set; promoting GIS awareness in K-12 by awarding a scholarship; and sponsoring activities to help promote GIS in local government.

Two committees were formed to further investigate some of the options. The internet committee includes: Fred Gifford, 444-5357; David Delsordo, 243-4347; Nita Grendal, 444-2500, Ron Reiter,542-0033. The school/scholarship committee includes Monty Sealy, 323-3032; Sue Haverfield, 758-5526; and Kris Larson, 444-5691. If you are interested in serving on these committees, please contact one of the representatives. If you would be interested in starting a training or activities committee, contact Fred Gifford.

At the second part of the business meeting the Montana GIS Interagency Technical Working Group (TWG) reported on their current activities. Randy Matchett, TWG Chair, explained to the group that the major focus of the TWG is to promote cooperative projects and develop standards for GIS. He reminded Group members that TWG meetings are open to anyone who wants to attend. To close the meeting TWG members gave reports on the statewide GIS base layers currently being developed. See related article on page 6 for current baselayer status.

"HEROS" continued from page 1

faced with the job of managing a water drainage as a resource for fisheries, communities, agriculture, industry and recreation. Incorporated with the simulations are basic science experiments that help explain the factual basis for water phenomena. The project will be accomplished using computer interfaced laboratory equipment to conduct micro-experiments in the classroom.

After conducting experiments and observing resources through simulators, students then apply what has been taught in the classroom to collecting water quality environmental data in the field and analyzing the information. GIS will be used extensively to help students merge geography and water quality data.

In addition, students traveled along the Columbia River and recorded water quality at the end of the school year on a ten day field trip. During this trip students made contact with other reservation schools to share water quality data in the Columbia River Basin via cellular phone and internet technology. Soon GIS will become the primary tool to pull together the environmental data and regionalize environmental conditions through monitoring and mapping.

Credits: Laboratory Interface Equipment is from SCT Technologies in Bozeman. Montana Natural Resource Simulators were developed by Dr. John Amend, Chemistry Department, Montana State University. Water Quality Field Measurements are conducted using EPA approved HACH equipment. Grant Writing and Project Director is Mark Decker, Ronan High School Science Teacher, Ronan, Montana.

Montana Statewide Basemap Layer Status

LAYER	RESPONSIBLE AGENCY	STATUS
TRANSPORTATION	USGS	DLG files for entire state complete. Available from NRIS.
UTILITIES		
TOPOGRAPHY*	USGS	72% of state complete for 7.5 and 15 meter DEM's, proposal made to USGS by TWG to complete remaining areas
HYDROGRAPHY*	USGS/NRIS/FWP	DLG files for entire state complete. Available from NRIS. Montana River Reach database currently in progress under joint project with NRIS and FWP.
U.S PUBLIC LAND SURVEY*	USGS/BLM	1:100,000 scale database currently in progress by BLM. Approximately 20% complete. 1:24,000 scale data available for some areas.
GEOGRAPHIC NAMES	USGS	DLG files for entire state complete. Available from NRIS.
BOUNDARIES	USGS	Available for some features, varying scales. Check with NRIS
ADMINISTRATIVE	USGS	Available for some features, varying scales. Check with NRIS
GENERALIZED OWNERSHIP*	BLM	Cooperative project currently under way with BLM acting as lead project manager. Assessment of pilot results in progress.
CENSUS GEOGRAPHY	Census Bureau	Entire state complete. Available from NRIS.
SOILS*	Soil Conservation Service	1:250,000 STATSCO complete for entire state, not certified by SCS yet. Available from NRIS. 1:24,000 12% of state complete.
LAND USE	USGS	
VEGETATION*	GAP Project/UM	Classification of Landsat Thematic Mapper images currently in progress for western half of state. Scheduled completion date December of 1995.
GEOLOGY*	Montana Bureau of Mines and Geology	1:250,000 manual mapping exists for part of state, lack funding for completion of manual mapping and digital conversion.

The Montana GIS Interagency Technical Working Group (TWG) has identified the 14 layers listed above as the most important for GIS users in Montana. Layers identified with and asteric (*) are currently in progress.

If you are interested in more detail about one or more of the layers listed above call Pam Smith @ 406-444-5354 and she can put you in contact with the TWG representative responsible for the layer.

If you would like to participate in the planning or development of statewide basemap layers or other colaborative GIS projects you may do so by participating the TWG. Contact Pam Smith at the number above, for meeting dates and more information.

GIS CONFERENCES

August 15-17, **Global to Local: Ecological Land Classification Symposium**; Thunder Bay, ON, Contect: Great Lakes Forestry Center, 705-949-9461.

ugust 15-19, **Army Corps of Engineers Symposium on Surveying, Mapping, Remote Sensing and GIS**; New Orleans, Le, Contact: Leonard P. Halphen, 504-862-1841.

August 26-29, **Mapping & Remote Sensing Tools for the 21st Century**; Washington DC, Contact: American Soc. for Photogrammetry and Remote Sensing , 301-493-0290

August 29-30, **Landsat & Beyond**; Baltimore, MD, Contact; Earth Observation Satellite Co., 407-856-7828.

September 12-16, **Resource Technology '94- Toronto "Decision Support - 2001"**; Totonto ON, Contect: Resource Technology, 303-490-1688.

September 13-15, **Digital Geographic Information System**; Washington DC, Contact; George Washington University, 202-994-6106.

September 20-22, **Networks Expo '94**; Dallas, Texas, Contact: Annie Z. Scully, 800-829-3976.

September 26-28, **Federal Geographic Technology '94 (FGT '94)**; Washington, DC, Contect: GIS World, 303-223-4848.

September 27-29, **GIS in the Rockies 1994**; Denver, CO, Contact; 303-932-2488.

October 11-13, **Integreting Social and Ecological Perspectives to Sustain Forest Health**; Coeur d'Alene, ID, Contact: Western Forestry and Conservation Assoc. 503-226-4562.

October 12-15, **The 17th Annual Applied Geography Conference**; Akron, OH, Contact; Kent State University, 216-62-2045.

October 14, **Geographic Information Technology Trends and Opportunities in Federal Government**; Washington D.C., Contact: GIS World, 303-223-4848.October 14-19,**National States Geographic Information Council (NSGIC) Annual Meeting**; Jackson Hole, Wyo, Contact: Nancy McCann, 307-777-5958.

October 23-28, **GIS/LIS '94**; Phoenix, AZ, Contect: GIS/LIS '94, 301-493-0200.

October 28-30, **NCGIA Initiative on Law**; Tempe, AZ, Contact: Harlan J. Onsrud, 207-581-2149.

November 6-11, **AWRA 30th Annual Conference and Symposia: National Symposium on Water Quality, Symposium on National Water Quality Assessment and Symposium on the Future Quality of the Great Lakes**, Chicago, IL, Contect: Phillip E. Greeson, 404-409-7700.

December 2-14, Sparks NV, **Fifth Annual Nevada State GIS Conference 1994**, Contact: Mark O'Brien 702-785-6440.

GIS TRAINING

August 15-19, **PC ARC/INFO**, Montana State University, Bozeman, MT. Contact: 406-994-2374.

August 22-24, **Advenced Techniques with ArcCAD**; Redding CA, Contact: VESTRA Resources, 916-223-2585.

August 22-24, **ArcCAD**, MT State University, Bozeman, MT. Contact: 406-994-2374.

August 24-26, **GIS in Utilities and Telecommunications**; Fort Collins, CO, Contact: GIS World, 303-223-4848.

October 5-7, **Environmental Applications**; Fort Collins, CO, Contact; GIS World, 303-223-4848.

October 21-23, **ESRI's Intro to ArcCAD**; Tucson, AZ, Contact: Skip Maselli, 602-326-7005.

October 23, **ArcView 2 Seminar**; Phoenix AZ, Contact: Skip Maselli, 602-326-7005.

October 24, **ArcView 2 Class**; Phoenix AZ, Contact: Skip Maselli, 602-326-7005.

October 27,**ArcView 2 Seminar**; Phoenix AZ, Contact Skip Maselli, 602-326-7005.

October 28-29, **ArcView 2 Class**; Phoenix AZ, Contact Skip Maselli, 602-326-7005.

October 28-30, **ESRI's Intro to ArcCAD**; Tucson, AZ, Contact: Skip Maselli, 602-32-7005.

November 2-4, **GIS in Real Estate**; Fort Collilns, Contact: GIS World, 303-223-4848.

November 7-9, **Advanced Techniques with ArcCAD**, Redding CA, Contact: VESTRA Resources, 916-223-2585.

November 21-23, **Advanced Techniques with PC ARC/INFO**, Redding CA, Contact: VESTRA Resources, 916-223-2585.

December 12-14, **Advanced Techniques with ArcCAD**, Redding CA, Contact: VESTRA Resources, 916-223-2585.

December 13-15, **PC ARC/INFO**, MT State University, Bozeman, MT. Contact: 406-994-2374.

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